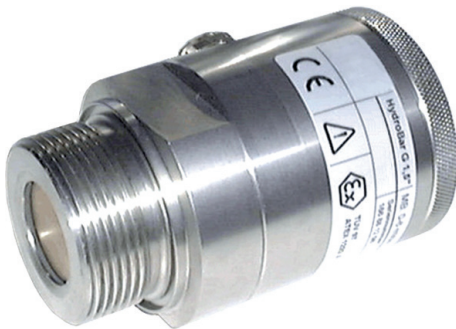




# FD-03

## Hydrostatic Level Measurement



## Features

- / 4...20 mA or 0...10 VDC output
- / 2- or 3-wire technology
- / ATEX approval for zone 0 and 20
- / Ceramic sensor element
- / High accuracy
- / Connections stainless steel or PVDF

## Description:

The FD-03 series of hydrostatic level sensors processes the static pressure of a fluid by means of a capacitive ceramic sensor element. It is designed with front-alignment and hence avoids nearly all faults due to sediments which is particularly important in the wastewater sector. The measuring transmitter is integrated into the probe and emits, at factory-set operating range, a 4...20 mA output signal based on the 2-wire system or a 3-wire 0...10 VDC output signal.

## Application:

The pressure probes FD-03 have been developed for deployment in harsh industrial conditions. They have been extremely efficient especially in the management of sewage plants for obtaining levels in tanks and vessels. The devices are selectable for all DIN ranges up to 200 m water column. Special operating ranges are available on request. The process connection is constructed intentionally in the large surface 1 1/2"-male version. Optionally, other connection types can also be supplied. Even when used in hostile media such as acids and alkalis, FD-03 were able to yield excellent results due to the consistency of the process connection made of stainless steel or PVDF and the capacitive ceramic sensor element made of 96% AL<sub>2</sub>O<sub>3</sub> or the even higher resistant 99% AL<sub>2</sub>O<sub>3</sub>.



## Electrical Specifications:

<b>Output signal /</b>	4...20 mA, 2-wire or 0...10 VDC, 3-wire
<b>Supply /</b>	for 4...20 mA output: 9...32 VDC, for Ex-Version: 14...28 VDC for 0...10 VDC output: 12,5...32 VDC
<b>Permissible load /</b>	4...20 mA, 2-wire: $R_{max} = [(U_B - U_{Bmin}) / 0,02A] \Omega$ 0...10 VDC, 3-wire: $R_{min} = 10 \text{ k}\Omega$
<b>Current consumption /</b>	for 4...20 mA max. 21 mA for 0...10 VDC max. 5 mA
<b>Influence effects /</b>	
Supply:	0.05% FSO / 10 V
Load:	0.05% FSO / k $\Omega$
<b>Long term stability /</b>	$\leq + 0,1\%$ FSO / year at reference cond.
<b>Turn-on time /</b>	700 ms
mean Response time:	< 200 ms
max. Response time:	380 ms
mean Measuring rate:	5/s
<b>Electrical protection /</b>	
Short-circuit prot.:	permanent
Reverse polarity prot.:	no damage, but also no function
EMC:	Emitted interference and interference immunity EN 61326
<b>Option Ex-protection</b>	Zone 0: ATEX II 1G Ex ia IIC T4 Ga
<b>SS process connection /</b>	Zone 20: ATEX II 1D Ex ia IIIC T 85°C Da
<b>Option Ex-protection</b>	<b>Zone 0/1:</b> ATEX II 1/2G Ex ia IIC T4 Ga/Gb
<b>PVDF connection /</b>	for $\leq 60$ mbar with „2G“ <b>Zone 20/21:</b> ATEX II 1/2D Ex ia IIIC T85°C Da/Db for >60 mbar and <10 bar item 17 of the type examination certificate must be attended!
<b>Safety rel. technical maximum values /</b>	$U_i = 28 \text{ V}$ , $I_i = 93 \text{ mA}$ , $P_i = 660 \text{ mW}$ , $C_i = 27 \text{ nF}$ , $L_i = 5 \mu\text{H}$ , $C_{\text{gnd}} = 27 \text{ nF}$
<b>EX-amplifier /</b>	KFD2-STC4-EX1
<b>max. Media-temp. in Ex-Zone /</b>	Zone 0 (-20...+60°C) for $p_{\text{atm.}}$ 0,8...1,1 bar abs. Zone 1 (-25...+70°C)
<b>Connecting cables (from manufacture) /</b>	capacitance signal line/shield as well as signal line/signal line 160 pF/m inductance signal line/shield as well as signal line/signal line 1 mikroH/m
<b>CE-conformity /</b>	EMC guideline 2014/30/EU
<b>Protection class /</b>	up to IP68 (depending on the el. connection, see ordering codes)

## Technical Specifications:

<b>Accuracy /</b>	standard: $\leq \pm 0.35\%$ FSO option: $\leq \pm 0.25\%$ FSO just for operating ranges $\geq 0.6$ bar (acc. to IEC 60770 - limit point adjustment (non-linearity, hysteresis, repeatability))
<b>Thermal error /</b>	$\leq \pm 0.1\%$ FSO / 10 K in compensated range -20...+80°C
<b>Storage temperature /</b>	-40...+100°C
<b>Temperature of electronics/environment /</b>	-40...+85°C
<b>Media temperature /</b>	-40...+125°C (PVDF -30...+125°C) -20...+60°C Ex-version Zone 0, -25...+70°C Ex-version $\geq$ Zone 1
<b>Materials /</b>	
Housing:	st. steel 1.4404 or PVDF
Pressure port:	st. steel 1.4404 or PVDF
Diaphragm:	standard: ceramic $\text{Al}_2\text{O}_3$ 96% option: ceramic $\text{Al}_2\text{O}_3$ 99,9%
Seals:	FKM (-40...+125°C) FFKM (-15...+125°C) EPDM (-40...+125°C)
<b>Wetted parts /</b>	seals, diaphragm, pressure port
<b>Weight /</b>	approx. 200 g
<b>Mounting position /</b>	any
<b>Operational life /</b>	> 100 x 10 <sup>6</sup> loading cycles
<b>Vibration /</b>	10 g RMS (20...2000 Hz) acc. to DIN EN 60068-2-6
<b>Schock /</b>	100 g / 1 ms acc. to DIN EN 60068-2-27



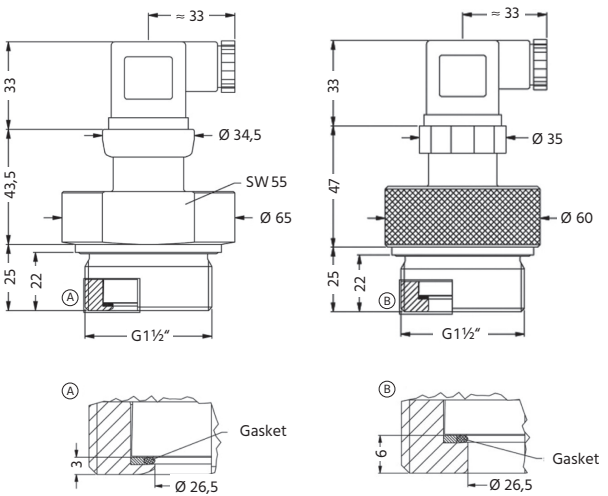
Operating ranges and Overload															
Nom. pressure [bar rel.]	0.04	0.06	0.1	0.16	0.25	0.4	0.6	1	1.6	2.5	4	6	10	16	20
Height of fluid [mH <sub>2</sub> O]	0.4	0.6	1	1.6	2.5	4	6	10	16	25	40	60	100	160	200
max. pressure [bar]	2	2	4	4	6	6	8	8	15	25	25	35	35	45	45
perm. vacuum [bar]	-0.2		-0.3		-0.5				-1.0						

## Dimensions in mm:

### Versions:

Process connection st. steel  
G 1½" flush (DIN 3852)

Process connection PVDF<sup>1)</sup>  
G 1½" flush (DIN 3852)



<sup>1)</sup> not possible in combination with field housing

## Ordering Codes:

Order-no. **FD-03. 0. 0. 1. 1. 1. 2. 1. 1. 1**

### FD-03 Hydrostatic Level Measurement

#### Operating range /

- 0a = 0.4 m water column, overload 2 bar
- 0b = 0.6 m water column, overload 2 bar
- 0 = 1.0 m water column, overload 4 bar
- 1a = 1.6 m water column, overload 4 bar
- 1b = 2.5 m water column, overload 6 bar
- 2 = 4.0 m water column, overload 6 bar
- 3 = 6.0 m water column, overload 8 bar
- 4 = 10 m water column, overload 8 bar
- 4a = 16 m water column, overload 15 bar
- 5a = 25 m water column, overload 25 bar
- 7 = 40 m water column, overload 25 bar
- 8 = 60 m water column, overload 35 bar
- 9 = 100 m water column, overload 35 bar
- 10 = 160 m water column, overload 45 bar
- 11 = 200 m water column, overload 45 bar

#### Gaskets /

- 1 = FKM (-40...+125°C)
- 3 = EPDM (-40...+125°C)
- 4 = FFKM (-15...+125°C)

#### Process connection /

- 4 = G 1½"-A male DIN 3852
- 99 = special connection, please specify in detailed text

#### Ex-approval /

- 0 = none
- 1 = ATEX-approval (only for 4...20 mA / 2-wire)

#### El. connection /

- 1 = field housing, stainless steel 1.4404 (IP67)
- 4 = plug connector ISO 4400 (IP65)
- 5 = Binder series 723 (IP67)
- 6 = M12 x 1, 4-pin (IP67)
- 8 = cable outlet (IP68)
- 9 = cable outlet with ventilation tube (IP68)

#### Output signal /

- 1 = 4...20 mA, 2-wire
- 2 = 0...10 VDC, 3-wire

#### Diaphragm /

- 1 = ceramics Al<sub>2</sub>O<sub>3</sub> 96%
- 2 = ceramics Al<sub>2</sub>O<sub>3</sub> 99.9%

#### Accuracy /

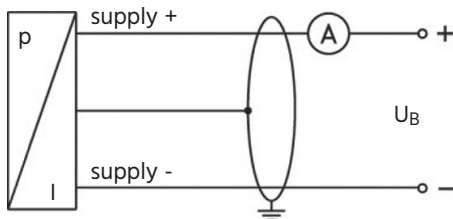
- 1 = ± 0.35 % FSO
- 2 = ± 0.25 % FSO (only for pressure ranges ≥ 0.6 bar)

#### Material of process connection /

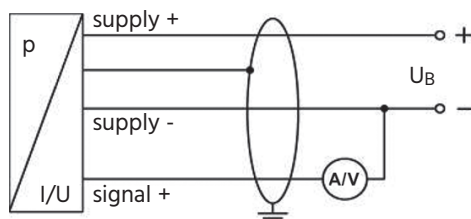
- 1 = stainless steel 1.4404
- 2 = PVC (on request)
- 3 = PVDF

## Wiring Diagram:

### 2-wire system (current)



### 3-wire system (current / voltage)



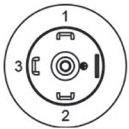
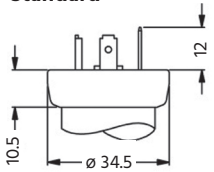


# Wiring Diagram:

	Electrical connections	ISO 4400	Binder 723 (5-pin)	M12 x 1 (4-pin)	Field housing	Cable colours (IEC 60757)
2-wire system	Supply +	1	3	1	IN +	white
	Supply -	2	4	2	IN -	brown
	Shield	ground	5	4	ground	yellow/green
3-wire system	Supply +	1	3	1	IN +	white
	Supply -	2	4	2	IN -	brown
	Signal +	3	1	3	Out +	green
	Shield	ground	5	4	ground	yellow/green

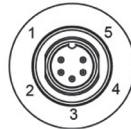
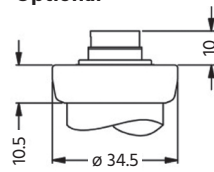
# Electrical Connection (mm):

Standard

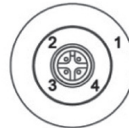
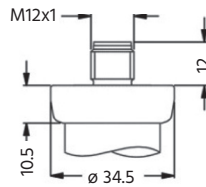


ISO 4400 (IP65)

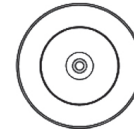
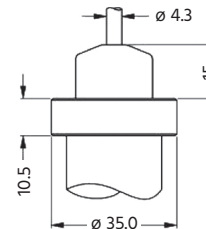
Optional



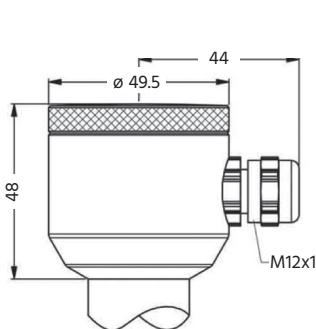
Binder Series 723 5-pin (IP67)



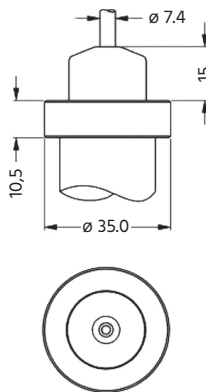
M12 x 1 4-pin (IP67)



cable outlet with PVC-cable<sup>4</sup> (IP67)



compact field-housing (IP67)



cable outlet, cable with ventilation tube<sup>5</sup> (IP 68)

<sup>4</sup> standard: 2 m PVC cable without ventilation tube; Permissible temperature: -5...+70°C

<sup>5</sup> different cable types and lengths available, permissible temperature depends on kind of cable